

# TORREYA

December, 1917.

Vol. 17

No. 12

## MUSHROOM POISONING

By\* BEAMAN DOUGLASS, M.D.

(Continued from October TORREYA)

### III. *General Consideration of Poisoning by Mushrooms*

Symptoms of poisoning by mushrooms may arise in four ways: (1) that is, a non-poisonous mushroom may cause trouble by not being digested or (2) if it is stale or decomposed it may develop substances analogous to spoiled meat which produces ptomaine poisoning or (3) certain mushrooms without spoiling if they are not eaten perfectly fresh develop a dangerous poison and lastly (4) the mushroom may be one of the varieties which contain a specific poison as a part of their normal contents and this poison, depending on its character, may cause slight disturbance to the body or serious illness or in other forms it regularly causes death.

1. *Indigestion*.—People differ greatly in their form of digesting mushrooms, in the amount used, and in the opinion regarding the desirability of the mushroom as an article of diet. One man will say they are not fit to eat, another like Theuriet will write "that one might even think he hears the violins of heaven singing while he is tasting a dish of mushrooms." With bigoted abstinence on the one hand, with gourmandizing and gluttony on the other and perhaps a bad cook in the kitchen even the most innocent and well-meaning mushroom will acquire a bad reputation.

All this brings us squarely against the question of their nutritive value—a fact much boasted by mushroom eaters and vegetarians who have labeled mushrooms "vegetable meat" and "beefsteak of the poor." Analysis has shown the fresh commercial mushroom to contain about 3 to 5 per cent. of protein substance, a quantity which makes them most comparable to cabbage

[No. 11, Vol. 17 of TORREYA, comprising pp. 183-206, was issued 30 November, 1917.]

or carrots. Mushrooms also contain a little fat, some sugar and phosphate, but as a whole they are to be considered vegetables of a low order and not as good as peas and beans or meat. We must remember, however, that it is perfectly absurd to measure the value of a particular food in terms of calories.

2. *Spoiled Mushrooms*.—If a perfectly edible form of mushroom is too old when gathered and especially if it is spoiled, softened, withered, stale or badly canned, changes may occur in its composition which render it unfit to eat. The symptoms of nausea, vomiting, headache, fever of 102 or pulse of 126 appear in one or two hours; to these is soon added a severe diarrhoea. The symptoms subside within a week without fatalities.

Mushrooms are also very early invaded by insects. These may be inoffensive but they are certainly not aesthetic. Some larvae, however, are poisonous and it is well to reject from your basket all mushrooms which are the feeding ground for small "worms." If the mushroom becomes softened and slimy we may assume that like putrid meat it is infected by microbes. These microbes produce a ptomaine called choline ( $C_2H_4OHN-(CH_3)_3OH$ ) which is also found in putrid meat. If this product, choline, is oxidized it becomes muscarine, the active poison of the "fly agaric" (*Amanita muscaria*) and other mushrooms. Choline and muscarine produce symptoms like cholera and may cause death.

3. *True Mushroom Poisoning* (poisoning from mushrooms due to a true poison contained in certain species).—It is an interesting fact that the most dangerous mushrooms are also the most perfectly evolved ones and are those which the botanist places at the head of his mushroom classification. There are more than 1,000 described varieties of mushrooms and of these there are only relatively few which if eaten are poisonous. The Department of Agriculture lists 72 varieties as "poisonous or suspected of being poisonous," while Dr. Murrill would reduce the number to between twenty and twenty-five varieties. To prevent poisoning by eating mushrooms there are two principles upon which to work; either be able to identify the poisonous ones surely or else learn to identify a few forms of edible mushrooms which do not

Group	Species	Clinical Classification of Poisoning		
		Name of Poison	Effects on Body	Poison Reaction
I. Excites muscle fiber.	Ergot of rye.	Ergotin.	Heart, blood vessels, uterus.	Not destroyed by heat. Symptoms after prolonged ingestion. Death rare.
II. Destroys red blood cells.	<i>Gyromitra esculenta</i> (if old or stale).	Helvellic acid or phalline.	Destroys red blood corpuscles. Oxygen starvation.	Not destroyed by heat or acid. Not dissolved out by hot water. Symptoms in 6-12 hours. Death 3 days or recovery in 1 week.
III. Gastro-intestinal irritant.	<i>Russulac</i> , <i>Lactarius</i> , (if peppery); <i>Entoloma</i> , <i>Boletus sensibilis</i> , <i>Panus stipticus</i> , <i>Cantharellus aurantiacus</i> , <i>Lepiota morgani</i>	A complex acid-resinoid.	Inflammation of stomach and inflammation of intestine.	Sometimes destroyed by cooking aided by gastric juice. Symptoms in 1 hour, recovery in 24 hours.
IV. Gastro-intestinal irritant plus effect on nervous system.	<i>Boletus luridus</i> , <i>Amanita cothrynata</i> , <i>A. muscaria</i> , <i>A. pantherina</i> , <i>Clitocybe illudens</i> , <i>Inocybe infida</i> <i>Pholiota autumnalis</i> .	Muscarine choline nevrine "pilz-atropin"	Gastritis and enteritis with excitation and paralysis of nervous system.	Not destroyed by heat. Dissolved out by boiling 5 mins. Symptoms in 1 hour—Recovery in 24 hours to 1 week.
V. Stimulates nervous system.	<i>Panaeolus campanulatus</i> , <i>P. retirugis</i> , <i>P. papilionaceus</i> .	Pilz-atropin.	Stimulates nervous system.	Dissolved by salt and water. Symptoms in 2 hours, recovery in 24 hours.
VI. Destroys nervous system and viscera after period of incubation.	<i>Amanita phalloides</i> . <i>A. solitaria</i> . <i>A. spretta</i> . <i>Amanitopsis volvata</i> .	Amanitin (Ford).	After a period of incubation (10-12 hours) destroys cells of brain, nervous system, liver and other viscera.	Not dissolved out. Not destroyed by heat or acid. Symptoms in 10 to 12 hours. Death in 3-4 days.

in the least resemble any poisonous variety, and then leave all others strictly alone. Another safe rule is never to eat a mess unless the identification has been checked up by at least one other person. Later we shall turn to this subject again. For the present, remember that a few mushrooms are deadly poison, others (a greater number) dangerous, and that the most deadly ones give only slow evidence of poisoning. It is because of this that when symptoms appear it is too late to offer any antidote. The body is overwhelmed with the poison before it is manifest. As the fatal dose of poison is indeed very small, one poison mushroom in the entire mess may be sufficient to kill a whole family.

Some investigators have studied poison forms from the morphological characters, others from their chemical contents, or have classified them empirically as irritant, dangerous or deadly. Dr. Roch in the above mentioned communication uses a clinical classification. As this is simple, we shall, with slight modifications, adopt it and combine it with the morphological or botanical arrangement.

*Group I. Fungus Exciting Action of Muscle Fiber.*—The well-known ergot of rye (*Claviceps purpurea*) acts in this way and furnishes physicians with a remedy of considerable value. The muscle tissue strongly contracted, especially the muscle of the uterus and of all blood vessels. In acute poisoning by ergotin vertigo, itching, anesthesia, weak pulse, delirium and stupor have been noticed.

Chronic poisoning, which in the Middle Ages was quite frequent, occurred from eating cereals and bread contaminated with ergot. After prolonged ingestion the poisoning assumed a convulsive form or a gangrenous form, in which the fingers and toes sloughed away from insufficient blood.

*Group II. Mushrooms Containing a Haemolytic Substance (Red Blood Corpuscle Destroyer).*—One mushroom which is said to contain this poison is *Gyromitra esculenta*. *Amanita phalloides* also contains it along with other poisons. The poison is called helvellic acid by some, phalline by other writers, and one (Roch) says it is destroyed by cooking and probably by the gastric juice

and is dissolved out by hot water and volatilized by drying, while another says it is neither destroyed nor dissolved by heat or acid. The later group of observers also say that these mushrooms if eaten young and fresh contain none of the poison, but the poison develops in old and stale specimens.

Poisoning often results fatally and there is a record for the last ten years in Germany of fifty cases with ten deaths from eating the *Gyromitra esculenta*.

Symptoms: Phalline causes symptoms only after it has been absorbed into the blood, therefore the symptoms appear from 6 to 12 hours after ingestion. Then the red blood corpuscles are disintegrated and oxygen starvation ensues. The succession of symptoms are distress, vomiting, purging, feebleness, vertigo, convulsion and unconsciousness. If death does not take place recovery ensues after several days. Autopsy reveals destruction of the blood and all the blood-forming organs and lesions of the liver, kidney and intestinal tract develop.

I have known a dinner party of eight people to eat freely of what appeared to be the *Gyromitra esculenta* and the juice resulting from cooking, without experiencing any difficulty. The toxicity seems to depend upon the age and freshness of the fruit, the cooking, the climate and soil, as well as upon individual susceptibility.

*Conclusion for this Class.*—People with good digestion may eat young and freshly gathered specimens of *Helvellas* and *Morells* if they have been well cooked. They should first be boiled ten minutes before preparing them in other ways and the water thrown away. Proper specimens if dried may afterwards be cooked and eaten.

*Group III. Mushrooms Producing Gastro-enteritis.*—This class includes such forms as *Panus stipticus*, *Boletus sensibilis*, *Cantharellus aurantiacus* (false chanterelle), *Lepiota morgani* (with green spores), *Russula emetica*, *Lactarius torminosus*, *Stropharia*, *Amanita muscaria*, and all peppery tasting *Russulae* and *Lactarii*. The edibility of these forms is extremely doubtful, some authorities regard them as poisonous, others regard some as edible, still others believe that by special methods of cooking they

are rendered harmless. Roch states that the poison is removed by boiling ten minutes in acidulated (vinegar) water and then even *Russula emetica* is safe. The negroes of the southern states are said to have learned empirically how to prepare this class, as well as *Amanita muscaria* which they eat freely. This method of preparation will be given later.

The poison is an acid resinoid which has a disagreeable taste or is peppery. The symptoms are violent, but recovery usually ensues within 24 hours. They are the symptoms of a severe cholera infantum (summer diarrhoea). Beginning *one hour* after ingestion there is nausea, prolonged and severe vomiting, accompanied by abdominal pain and diarrhoea which may be foetid and bloody. If the victim is young or enfeebled such violent purgation may so exhaust the water from the body and the brain that convulsions and death may ensue. Recovery within 24 hours is the usual rule.

*Conclusions.*—If boiled in acidulated water (1 cup vinegar to pint of water) for ten minutes, washed afterwards and all liquids thrown away, this class may be cooked and eaten with safety, although not without some misgivings unless one is a sophisticated and hardened mycophagist.

*Group IV. Mushrooms Affecting Chiefly the Nervous System and the Gastro-Intestinal System.*—This group, which like the preceding one is abundant, is made up of *Boletus luridus*, *Amanita cothornata*, *Amanita muscaria*, *Amanita pantherina*, *Clitocybe illudens*, *Inocybe infida* and perhaps *Pholiota autumnalis*. They produce both phenomena of gastro-intestinal irritation and irritation of the nervous system. This means that we have arrived at a group where special symptoms are present from a poison which affects chiefly the brain and spinal cord. Curiously enough sometimes the intestinal symptoms predominate, sometimes these are suppressed and the nervous symptoms are chiefly important. The locality of growth, the season and especially the culinary preparation seem to be responsible for this difference.

The two chief members of this group are *Amanita muscaria* (false orange mushroom; fly killing mushroom) and *Amanita pantherina*, and it is from the ingestion of these that many poison cases arise.

Roch\* says that *Amanita muscaria* does not deserve its bad reputation and states emphatically that it does not kill. He recalls the fact that in Russia it is eaten freely if the cap is peeled and the mushroom soaked in acidulated water. In Siberia also the natives use the poison of *Amanita muscaria* in religious ceremonies to produce cerebral intoxication, excitement and ecstasy. He points to the fact that the poison is eliminated from the body by the kidneys with great rapidity and that in order to continue this cerebral debauch the dose is frequently repeated by drinking the excretion. Evidently there is something very desirable and nothing very dangerous about this drunkenness from *A. muscaria* or whatever alkaloid it may be that is contained in *Amanita muscaria*. The lesser symptoms are like a real alcoholic or cocaine intoxication; excited heart action, dizziness, laughing and crying, a desire to jump and dance, to run and sing, the devotees of muscarine (or as Roch calls it "pilz-atropin") are perfectly happy, they are in high spirits, experience religious ecstasy and this is all increased by ocular hallucination, in which distances are greatly increased, and size is distorted. They also have delightful visions of singing birds, palaces and beautiful landscapes. These symptoms remind one of the effect from hasheesh or Indian hemp as well as the effects of *Panaeolus* poisoning mentioned earlier in my paper.

Roch claims these symptoms are due to nevrine or pilz-atropin. He denies that muscarine can produce any such cerebral stimulation, claiming that muscarine in non-poisonous doses produces increased saliva, sweating, diarrhoea or colic, and contraction of the pupil, while in the poisoning from this class of mushroom we have added to the gastro-intestinal irritation produced by the muscarine or choline a wholly new group of symptoms produced by a substance he calls fungus atropine or pilz-atropin. When this particular effect upon the brain and nerves is more violent and serious the symptoms narrated above disappear and there sets in headache, fixed hallucinations, delirium, convulsions, loss of sensation, stupor, coma and perhaps death.

Roch states, however, that to meet death in this class the

\* L. c., p. 63.

sufferer must have eaten *Amanita pantherina*. He states that poisoning by *Amanita muscaria* results in 100 per cent. recovery.

The symptoms from this class of poisoning develop within one hour. Recovery may require a day or a week.

*Conclusions.*—The poison is not destroyed by heat but it is soluble in hot water after five minutes' boiling. As I mentioned before the southern negroes may possibly be able to prepare this *Amanita muscaria* in a way which renders it edible.

The hot water boiling five minutes dissolves out the muscarine and neutralizes the acrid resinoid. Washing in salt and water removes the phalline and perhaps the pilz-atropin and if this does not, then steeping in vinegar removes any residual part of the poisons. As the poisons are not destroyed, only dissolved out of the mushroom, we must throw away all the water and vinegar used in preparing them.

*Method of Preparation.*—This method of preparing mushrooms should be used in all cases where there is any doubt about the edibility of the variety to be tried. But we must remember that there are poisonous mushrooms which never give up their poison by this method, namely, *Amanita phalloides*, *Amanita sprete*, *Amanita solitaria*, *Amanitopsis volvata* and stale *Gyromitra esculenta*. For all forms except these we may consider this method of preparation one which will remove or neutralize the poison.

This preparation is as follows:

*Preparing Poisonous Mushrooms for Eating*

The following mushrooms are always deadly. The poison is not removed from them by any culinary preparation:

*Amanita phalloides*

“ *citrina*

“ *verna*

“ *virosa*

“ *spreta*

“ *mappa*

*Amanitopsis volvata*

*Volvaria eleganti* (Europe)

*Gyromitra esculenta* (if old or stale).

Culinary preparation which probably renders dangerous forms edible:

1. Scrape the stem.
2. Remove the gills.
3. Peel the cap (most poison is here).
4. Boil in salt water ten minutes (handful salt in 2 quarts water).
5. Steep in vinegar five minutes (bleaching process).
6. Wash in water, rejecting the water.
7. Cook any way you wish.

1. Scrape the stem, remove the gills, peel the cap (most poison here).

2. Boil in salt water ten minutes (this removes the phalline,



and toxic albumins, including pilz-atropin, and destroys the acrid resinoid).

3. Steep in vinegar five minutes (removes muscarine). The poisons are now removed or neutralized.

4. Cook as desired.

*Group V. Stimulating only the Nervous System.*—This group includes *Panaeolus campanulatus*, *P. venenosus*, and *P. retirugis* and *P. semiglobatus*.

The symptoms occasioned by the pilz-atropin contained in this group have been elaborated in the earlier part of this communication.

*Conclusions.*—The symptoms were purely those of a stimulated nervous system. I can not conceive that a full meal of these mushrooms could cause death. The poison may be dissolved out by steeping and soaking in salt and water. The water used should be rejected.

*Group VI. Mushrooms Causing Cell Destruction after a Prolonged "Incubation."*—This series which cause a destruction of certain cells of the body after a prolonged period of unmanifested activity are excessively dangerous and usually fatal. *The poison can not be removed before ingestion by any method yet known.* It is not volatile, is not dissolved out, nor destroyed by boiling nor by acidulated water. The pity is that when once the symptoms appear the poison has been entirely absorbed, is ready to explode as it were, and the whole illness is so sudden, so violent, so hopeless that these features alone have caused the general condemnation of all mushrooms except the one commercial form. It is astonishing that as small a quantity as one-third of a cap of *Amanita phalloides* caused symptoms in twelve hours and death in ninety hours afterward.\* The poison is also much more rapid and fatal in infants and youths and curiously enough it is the mushrooms of this class which are oftenest gathered and eaten in error. Therefore the Amanitas are not only the most dangerous mushrooms but they appear to be also the most frequent causes of poisoning. The toll of death is heavy—Gillot states it is 63 per cent. Roch estimates the mortality as 49 per cent. and

\* Plowright, Lancet, 2: 941. 1897.

states that there are a great many cases. A study of combined statistics for all ages of victims and all varieties of *Amanita* of this class shows a mortality of 52.6 per cent. This toll of death strikes terror in our minds. There are only eight species belonging to this terrible class. They are *Amanita phalloides*, *A. solitaria*, *A. virosa*, *A. verna*, *A. citrina*, *A. mappa* and *Amanitopsis volvata*.

*Poisoning*.—There are probably two virulent poisons in mushrooms of this type. The first is phalline, which was the blood-destroying principle which we mentioned in the poisoning by stale *Gyromitra esculenta*. This poison is destroyed by heat and dissolved in salt and water.

The second poison is best known by the name of *Amanita*-toxin (Ford). It is most abundant in the cuticle of the mushroom next in the gills and least in the flesh of the cap. *It is not destroyed by any method which leaves the mushroom in a condition in which one would eat it.*

*Symptoms*.—There are no symptoms at all for eight to twelve hours after ingestion of this class of mushrooms; during this time absorption of the poison has been going on and the accumulated effects usually break out suddenly and violently and, as often happens, in the middle of the night or in the early morning. Lightning is not more dangerous, nor fate more certain when once the symptoms begin.

If the *Amanita* has been eaten raw the symptoms are increased by the disorganization of the blood due to the phalline. If the mushroom was cooked the symptoms are like Asiatic cholera in their severity and rapidity. From a sound sleep the sufferer awakens with terrible abdominal pains—vomiting, and a continuous diarrhoea. So severe are these that the patient is soon in a very sad state. The internal organs and the nervous system especially are deprived of the water which has drained away in the stools and delirium sets in. The heart and blood vessels contain too little blood and heart failure begins. The kidneys and liver refuse to act. Somnolence now intervenes at the end of forty-eight hours and the patient becomes quieter. The pain and diarrhoea cease, but it is only a false improvement. Exhaustion

sets in and death results the third or fourth day, the later symptoms indicating grave changes in the liver, kidney and brain.

*Conclusion.*—If you are to gather your own mushrooms learn these poisonous forms so that you are able to recognize them as easily as you recognize the letters of the alphabet. Destroy every poisonous mushroom you see and for safety destroy other mushrooms growing in the immediate vicinity of the poisonous one.

There is a belief current among the populace that edible mushrooms growing near poisonous ones are rendered poisonous by this proximity. I can not say if this is so and botanists to whom I have spoken about it laugh at the idea, and yet I might believe that poisonous spores or poisonous gill fragments or even pieces of poisonous cuticle might settle upon the caps of innocent edible neighbors. Therefore, I say be on the safe side and destroy all mushrooms in the immediate vicinity of the poisonous ones.

*Prevention.—Prophylaxis:* The question of the prevention of mushroom poisoning must be considered now, for it is in the prevention that to-day there is more hope than in the treatment of the poisoning. There are more than 100 serious cases each year in France and of course many hundreds throughout the civilized world. The death rate is small if we consider all cases, but as each death is the result of carelessness, it is wholly inexcusable. Mushrooms are not such valuable vegetables that one can afford to try any experiments and each one who expects to eat those of his own hunting must learn one or two important rules and rid himself of much erroneous information which the public will furnish. I have formulated the question of prevention of mushroom poisoning as follows:

Rule I. Learn first to recognize every *Amanita* and *Gyromitra esculenta*.

Rule II. As soon as possible be able to identify the twenty-two varieties which are named on page 219.

Rule III. If you are sure you have not an *Amanita* you may taste a piece the size of a dime. If it tastes good and no symptoms follow the ingestion of a small piece you may cook one, throw away the water in which it is cooked, and eat it. If no symptoms arise that day and you like your new-found friend you may cautiously increase the dose.

Rule IV. Take two years if necessary to find out all about an unknown variety. If you do this Rule III will never cause you any trouble.

Rule V. Neither use the water in which an unknown variety has been cooked nor soups, sauces, gravies, etc., made from it.

Rule VI. All mushrooms should be well cooked. Avoid soft, stale, tough and old ones.

Rule VII. Soaking in salt and water then steeping fifteen minutes in vinegar and water, washing, and finally cooking will render inoffensive *Helvella*, *Russulae*, *Lactariae*, as well as *Amanita muscaria* and *Amanita pantherina*. Scraping the stem, peeling the cap and removing the gills before soaking are useful adjuncts.

Rule VIII. The above method does not change in the least the danger from the *Amanita phalloides* group.

Rule IX. Because slugs, ants, insects or ruminants eat a mushroom it does not follow that it is harmless for man.

Rule X. The popular notion that mushrooms are edible if they taste agreeable, do not coagulate milk, do not turn a piece of silver black, do not change color on breaking must be forever dismissed. The deadly Amanitas do none of these things.

Rule XI. People are usually susceptible in regular ratio to their age—children are very susceptible, so are enfeebled persons and those who are below normal weight.

Rule XII. In general, the earlier the poisonous symptoms are manifested after eating a poisonous variety of mushroom, the better the chances for a quick recovery, the less danger to life. The very dangerous kind give symptoms from eight to twelve hours after eating.

Rule XIII. Study your idiosyncrasies—some stomachs tolerate the most violent and irritant forms and destroy poisons. Nobody is proof against the *Amanita* class.

Rule XIV. The following mushrooms are all harmless and very good to eat. They are so different in appearance from the poisonous kinds that one cannot make mistakes in gathering them. They are found within one hundred miles of New York at the time mentioned, further south they are earlier—further north later.

1. May . . . . . *Morchella* (morels) *Coprinus* (inky cap mushroom).
2. June . . . . . *Morchella* " " " " "  
*Russula flavida* (yellow russula).
3. July . . . . . *Russula flavida* (yellow russula).  
*Hypholoma appendiculatum*.  
*Pleurotus ostreatus* (oyster mushroom).  
*Marasmius oreades* (fairy ring mushroom).  
*Clavaria* (coral mushroom).
4. August . . . . . *Calvatia* and *Lycoperdon* (puff balls).  
*Clavaria* (coral mushroom).  
*Cantharellus cibarius* (chanterelle).
5. September . . . . . *Polyporous sulphureus*.  
*Agaricus campestris* (common mushroom).  
*Calvatia* and *Lycoperdon* (puff balls).  
*Boletus scaber*.  
*Boletus edulis*.  
*Boletus granulatus*.
6. October . . . . . *Fistulina hepatica* (beefsteak mushroom).  
*Boletus* (as above).  
*Coprinus comatus* (shaggy mane).  
*Coprinus atramentarius* (inky cap).
7. Late October, Novem-  
ber, December . . . . . *Hypholoma perplexum*.  
*Collybia velutipes*.

*Treatment.*—If one has eaten, or if one is even suspected of having eaten a poisonous mushroom, treatment should begin at once. Fortunately, there is much an amateur may do and some very efficient remedies are usually at hand even in mountain resorts and camps.

I. The first aim in treatment is to neutralize the poison and prevent its absorption into the body. There are three common remedies for this: 1. Vinegar or any weak acid; 2. Tannic acid, which may be found in tea leaves or any dried or fresh leaves or even pine needles; 3. Charcoal, which is supposed to absorb the poison. Vinegar may be used in a half-cupful dose diluted with an equal quantity of water. Muriatic or nitric acid must be used much weaker, about one half teaspoonful diluted in a cupful of water. Charcoal is made into a paste with water and swallowed *ad libitum*. Of these charcoal is of doubtful use and should not be employed unless the other remedies can not be obtained. 4. Solutions of tannic acid may be obtained by boiling for fifteen minutes either tea leaves or pine needles or oak leaves and the liquid sometimes administered in doses of two or three cupfuls.

II. The stomach should now be emptied—after a wait of fifteen minutes if the above remedies are used or at once if they are not used. I know of one life probably saved by mustard and water after eating a large piece of *Amanita verna*. Household emetics are always on hand. Soap suds, a tablespoon of salt and a cup of tepid water, mustard, one-half teaspoonful to a cup of tepid water, one half cup of linseed oil or sweet oil. These remedies will always occasion prompt vomiting and if they do not the victim should swallow about a quart of tepid water and the index finger should be shoved over the back of the tongue into the throat and held there, pressing forward on the base of the tongue until the contents of the stomach are rejected. This should be repeated several times until no more pieces of mushroom are observed in the ejected material. At a pharmacy one may obtain syrup of ipecac or sulphate of copper solution (30 grains copper sulphate), both of which are efficient emetics.

III. The third step in the emergency treatment is the use of a purge to bring from the intestinal tract any of the poison which has passed from the stomach. For this purpose a tablespoon of Epsom salts dissolved in a glass of water or two ounces (six tablespoons) of castor oil should be administered fifteen minutes after the victim has stopped vomiting. The purge should not be withheld because the victim is already purging. Diarrhoea is an indication for the use of a purge.

IV. If the patient becomes exhausted and stimulants are necessary, coffee and tea (both very strong) may be used. *Alcohol should never be administered by the stomach in cases of mushroom poisoning.* Strangely enough, it is the one thing people are always recommending and it is usually at hand.

Alcohol dissolves the poison from the mushroom very rapidly, and then both alcohol and poison are quickly absorbed by the victim. Therefore alcohol used when there are any remnants of mushroom in the victim's stomach will increase the poisoning and may cause a fatal result where one might possibly without the alcohol have made a recovery. A physician may use alcohol by hypodermic injection but it must never be swallowed.

V. These means having been used there is not much else to do

unless one is practiced enough to know how to administer a medicament with a hypodermic syringe. A physician would use morphine sulphate gr. 1-6 to control convulsions and pain, he would give hypodermics of digitalis and alcohol and camphor to stimulate the heart. He would inject under the skin of the abdomen or the thigh about 500 cc. (1 pint) of a normal salt solution to replace the water drained from the body by the vomiting and purging and lastly he would use one or two hypodermics of atropine sulphate gr. 1-100. This remedy, atropine sulphate, is said to be a specific antidote to every poison except the fatal poison amanitin (Ford). The atropine sulphate is most useful for the symptoms which occur in the late stages of the poisoning. It checks secretion from the skin and gastro-intestinal tract. It therefore stops the exhaustive diarrhoea and it stimulates the brain and keeps the respiration and the heart going until the patient can neutralize or eliminate the poison.

The researches of Ford would indicate that atropine sulphate is a true specific against all mushroom poisons except amanitin (Ford). Every amateur who expects to collect and eat his mushrooms should learn from his physician how to administer hypodermic medication and should carry along with his botanical books and his bottle of vinegar, a hypodermic syringe and a few precious tablets of atropine sulphate.

## THE GENUS ANAMOMIS IN FLORIDA

BY JOHN K. SMALL.

In the spring of 1904, Mr. P. Wilson and the writer collected specimens of twigs of a species of *Anamomis* from an old stump at a lately abandoned surveyor's camp on Long Key in the Everglades. In the winter of 1909, Mr. J. J. Carter and the writer collected similar twigs from stumps in the hammock on the eastern end of Long Key. About the same time we found some rather poor flowering specimens of the same kind of tree in the hammock of the small key which lies west of the southern part of Royal Palm Hammock.